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# STUDY PROJECT

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WHITHER THE HEAVY FORCES IN THE POST-CONTAINMENT WORLD?

BY

RICHARD W. MUNT, Ph.D.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Whither the Heavy Forces in the Post-Containment World?		5. TYPE OF REPORT & PERIOD COVERED Study Project
7. AUTHOR(s) Dr. Richard W. Munt		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army War College Carlisle Barracks, PA 17013		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Same		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE 20 April 1990
		13. NUMBER OF PAGES 47
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution is unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This paper argues that heavy forces, as currently understood in modern armies, are irrelevant for the United States in the emerging world order. The United States will, in the future, be confronted with a plethora of potential regional adversaries and contingency requirements, while largely being based at home. This will put a great premium on rapid deployability over long distances. However, these potential adversaries of the third world possess quite formidable modern armies which, combined with the "home field" advantage, dictate that a U.S. expeditionary force have both firepower and survivability characteristics		

## 20. Abstract (continued)

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USAWC MILITARY STUDIES PROGRAM PAPER

WHITHER THE HEAVY FORCES IN THE POST-CONTAINMENT WORLD?

AN INDIVIDUAL STUDY PROJECT

by

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## ABSTRACT

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DATE: 20 April 1990 PAGES: CLASSIFICATION: Unclassified

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WHITHER THE HEAVY FORCES  
IN THE POST-CONTAINMENT WORLD?

CHAPTER I  
INTRODUCTION

Peace is a goddess only when she comes with sword girt  
on thigh.

-Theodore Roosevelt, to the Naval War  
College, Newport, R.I., 2 Jun 1897

This paper argues that heavy forces, as currently understood in modern armies, are irrelevant for the United States in the emerging world order. As a consequence of that, the U.S. Army should totally overhaul the present Armored Systems Modernization (ASM) development and demonstration program.<sup>1</sup> Specifically, the U.S. should consider new concepts in automotive, armor, and armament technology to permit an array of physically lighter forces which would be nonetheless effective against heavy armies. Barring that, the U.S. has only two practicable options: It may massively finance air and rapid sealift or it may abandon altogether those military objectives which demand a rapidly deployable force capable of confronting one of the heavy armies now existing throughout the world. Neither alternative is palatable nor necessary.

The historic events of 1989 have demonstrated both the non-viability of the communist political and economic system and the atrophy of the Soviet military machine in the conventional arena. The breakup of the Soviet's East European empire, its retreat from Afganistan, and its withering economy, have immeasurably reduced the likelihood of a major East-West conflict. However, as this bipolar confrontation recedes from probability, the rise of new regional military and economic powers is creating a multipolar world with many new and diverse regional threats to U.S. interests.

This picture of the world leads to the observation of four fundamental situations for U.S. forces in the foreseeable future and three corresponding military corollaries. The four situations are:

- U.S. forces will be at home,
- The threats demand contingency<sup>2</sup> operations,
- Opponents may be large and heavily armored,
- U.S. economic concerns will outweigh military concerns.

The three military corollaries that derive from the above situations are:

- U.S. forces will have to move fast and go anywhere,
- They will be smaller and budget-constrained,
- They must have firepower, mobility, and survivability.

The approach of the U.S. has been to field a mixed force of "light" and "heavy" units in order to address its multiple and diverse requirements.<sup>3</sup> This force structure, especially the heavy fraction, has had great utility in the cold war era wherein the opposing Soviet forces were also heavy. The utility of the light fraction has always been hotly debated.<sup>4</sup> This paper concludes that, given the above situations and corollaries, the retention of a combined light plus heavy approach is probably non-workable. Instead, a new paradigm of force structure is required to achieve maximum military utility in the new world order with the least possible risk. This paper contends that the new paradigm should be a force structure predominately of a new "light armored division." This division would be based upon massive firepower from rockets, missiles and main tank guns, all vehicle-mounted on a new common light, but armored, chassis. Protection would be afforded through advanced technology, lightweight armor and small target size in addition to the various deception techniques (i.e., stealth<sup>5</sup>). In addition,



further weight savings can be realized by the use of composite materials throughout truck frames and bodies. The total effect of these weight savings will further lessen the logistics requirements for fuel and parts. This form of armored division will be sufficiently light that air deployment of multiple divisions can be made if circumstances demand, yet at the same time providing the force with the firepower and protection required against opposing heavy indigenous forces.

#### ENDNOTES

1. The Armored Systems Modernization program is the Army's current development and demonstration effort to provide a suite of new tracked, armored combat and combat support vehicles for fielding at about the turn of the century. Until recently, it was called the Heavy Force Modernization (HFM) program. As the original name suggests, the emphasis is on heavily armored vehicles and explicitly targets the anticipated Soviet capabilities in the next decade as the threat to beat. A recent name change to "Armored Systems Modernization" does not change this perspective as it only reflects the addition of a light tank replacement for the aging M551 Sheridan for airborne use, a specialized mission.

2. The principle feature of a contingency is that of uncertainty. Thus, while conflict may be deemed possible, it is never certain. This further leads to the frequent crisis nature of the event, wherein speed of response is often critical. Thus, reaction time, not warning time, is paramount. Warning time is a popular justification today for diminished U.S. presence in Europe, but it is not usually germane in a contingency situation.

3. The complete suite also includes Special Operations Forces (SOF). This paper does not attempt to argue the

requirements for SOF, but only for light vs. heavy. The SOF is ignored throughout the arguments of this paper, but is presumed to be a permanent fixture of the force structure.

4. See, e.g., David Segal, "Army Light Infantry Divisions: Are They Fit to Fight?" Armed Forces Journal International, October 1988, p. 82.

5. "Stealth" includes conventional protection such as smoke and camouflage, plus various infrared (IR) and microwave radar (MWR) reducing technology. The IR and MWR take on additional significance at night wherein the U.S. should attempt to fight to maximize its technical advantage, especially against third world armies whose sensing technology lags behind.

## CHAPTER II

### HISTORICAL UNDERPINNINGS OF THE HEAVY AND LIGHT FORCES

Superior force is a powerful persuader.

-Winston Churchill: Note to the First Sea  
Lord, 15 October 1942

All the nations of the world have lived, fought, or, as a minimum, been shaped by the Cold War that began as the Iron Curtain "descended across the continent," after the defeat of Nazi Germany forty-five years ago. The U.S. strategy to "fight" this cold war was quickly forthcoming. Simply put, it called for containment of the Soviet Union's expansionistic tendencies. This containment would be executed by any and all instruments of power at any point outside the roughly sketched perimeter of communist control and would continue until the Soviet government abandoned its imperialistic ways.<sup>1</sup> An arms race developed, involving the new weaponry of the modern age, until both sides were in permanent jeopardy of vaporization. This tension has been the foundation of international relations for over forty years.

The containment policy was not envisioned as a permanent state of affairs, but presumed that the Soviet imperialism would eventually dissipate itself.<sup>2</sup> That belief was based largely on the notion that the fundamental contradictions of communism and the heavy financial burden of the Soviet military and foreign policies would soon take their toll. Although the initial proponents probably never expected such a lengthy period of tension, the overall strategy appears finally to have come to fruition as the Soviet empire crumbles.

#### THE GROWTH OF THE HEAVY CONCEPT

While committed to containment worldwide,<sup>3</sup> the U.S.

continued to see, as it did during World War II, that Europe was its primary interest. In the late 1940's, the Soviet Army, heavily mechanized and armored in accordance with the lessons of World War II, loomed threateningly over Europe as the Eastern European countries fell under Soviet domination. The U.S., having demobilized rapidly from the war, deterred (in its own mind, at least) further Soviet expansion westward by the threat of nuclear attack. The threat was viable while the U.S. held a monopoly on nuclear weapons and had the strategic bomber capability to execute it.<sup>4</sup>

With its loss of nuclear monopoly, the U.S. sought to raise the nuclear threshold of war by creating a credible conventional force deterrent primarily in Europe. In conjunction with allied capability, the U.S. developed its conventional forces tailored to the European theater. These forces, like the Soviets', were mechanized and armored, following the World War II paradigm. Against the forward deployed Soviets, the U.S. similarly sought to forward deploy significant troops and equipment, to preposition additional heavy equipment and supplies, and to prepare for the reinforcement of those forces already there. In short, the U.S. spent years preparing for a war in Europe and placing much of its warfighting capability over there in order to be at the front on time with sufficient force to effectively counter a fully mobilized Soviet-led Warsaw Pact attack.<sup>5</sup> These forces emphasized mechanization and armor, providing maneuver on suitable terrain, firepower, and survivability<sup>6</sup> against a similarly armed opponent.

#### THE DEVELOPMENT OF THE LIGHT CONCEPT

A heavy force is not complete as it does not address three additional requirements for the U.S.: (1) rapid response contingency action, (2) conflict in locales not suitable for mechanized warfare, and (3) operation against irregular forces. For these situations, the U.S. retains airborne, light, and

special operations forces tailored to these tasks. By their nature, they are easily and rapidly deployable. Although incapable of standing up directly to a Soviet mechanized attack, some of these forces are also considered reinforcements to the European theater for restricted assignments.<sup>7</sup> The massive buildup of the conventional light forces army in Vietnam was the first case wherein the armored defense of Europe became secondary to the immediate needs of another conflict demanding a different force structure.

After Vietnam, the fall of the Shah of Iran and the Soviet aggression in Afghanistan led to a renewed concern over a U.S.-Soviet confrontation in that region.<sup>8</sup> A U.S. response was deemed necessary to deter possible Soviet aggression against the Persian Gulf states. Such aggression would accrue three strategic advantages to the Soviet Union: Access to the Indian Ocean, access to additional oil, and, most importantly, a stranglehold on a major source of oil for the West. The U.S. had no significant military presence in the region and had to address the problem of conducting a contingency operation at the greatest possible distance and against the same foe it had spent years preparing for in Europe. Moreover, such an operation would most likely call for forced entry. Prepositioning was out of question, politically and financially.

The existing heavy forces were too heavy for rapid deployability, and on the other hand, the existing light forces too weak, though more deployable. The Army therefore set about creating a new light division (about 12,000 tons<sup>9</sup>). The new light division is laden with lightweight anti-tank missiles and light trucks, but empty of armor, with an (arbitrary) goal of only 500 C-141 equivalent sorties.<sup>10</sup> The C-5 is not even required. This is compared to the 2500 C-5 and C-141 sorties required for an armored division (about 100,000 tons<sup>11</sup>). The value of the resulting "motorized" division, of which the 9th Infantry Division is now the archetypical example, has been

challenged ever since,<sup>12</sup> particularly because of its deficiency of armor. Nonetheless, initial enthusiasm for the concept was so high that there was talk of converting up to 14 of the 28 Army divisions (active and reserve) to this light concept (There are currently five light divisions plus the 82nd and 101st Airborne and Air Assault Divisions).

#### MODERNIZATION OF THE HEAVY FORCE

In the continual preparation for the European war with the Soviets, the U.S. has had to periodically modernize its conventional ground forces in order to keep its non-nuclear deterrent credible in the face of a Soviet force that continuously improved in both quality and quantity. Among the principal ground combat equipment, the U.S. began fielding the M60 tank and the M113 armored personnel carrier (APC) in 1960, replacing earlier equipment. In 1963, the Army began fielding the M109 armored self-propelled howitzer and the larger, but unarmored, M107 and M110 self-propelled howitzers. In response to Soviet improvements, the M109 and M110 have been upgraded twice, and the M107 retrofitted to the more powerfully gunned M110. Most recently, the U.S. has added the Multiple Launch Rocket System (MLRS), yielding vastly more firepower and range to the indirect fire mission. The APC, itself having been upgraded, is now being partially replaced by the M2 Infantry Fighting Vehicle (IFV) with vastly more firepower and armor. Finally, the M60, having been upgraded three times, has been replaced by the better armored, gunned, and mobile M1 tank. The M1 itself was upgraded in 1985 to the M1A1 with additional firepower.<sup>13</sup>

The Army recognized in the late 1980s that by the end of the century, most of its armored combat weapons would again face obsolescence in the face of the expected continuation of advances in Soviet weaponry. Hence, the Army formulated its Heavy Force Modernization (HFM) program to address improvements in the entire suite of armored combat and combat support vehicles in an

integrated fashion. The HFM program has as its basic concept the application of a limited number of chassis common to a larger variety of tracked combat and combat support vehicles. Two major benefits are expected from this approach, one a reduced acquisition cost and the other, an improved maintenance and readiness on the battlefield. The latter is rightly perceived as a powerful "combat multiplier."<sup>14</sup> As the name suggests, the notional common chassis is "heavy," typifying the desire for survivability through armor in the face of massive Soviet firepower. These new vehicles, as opposed to simple upgrades of the older generation, more readily permit new concepts in armor, new weapons and their support<sup>15</sup>, new automotive features, and, as previously stated, the opportunity to utilize a common chassis and accrue great fiscal savings. In its purest form, the common heavy chassis would include at least the tank, the combat mobility vehicle<sup>16</sup>, the IFV, and the self-propelled artillery. As the latter two vehicles are currently much more lightly armored than this, the common chassis approach continues the forty year trend towards heavier and heavier "heavy forces," despite the fact that the heaviest vehicle of the family, the HFM tank, is targeted for 55 to 62 tons, making it lighter than the M1A1 (about 65 tons empty).

The recent name change<sup>17</sup> to "Armored Systems Modernization" (ASM) does not change this "heavy" perspective although the program now includes the addition of a light airdrop-capable tank.<sup>18</sup> This "light" effort is limited to the replacement of small numbers of the aging M551 Sheridan used by certain light forces in special missions.<sup>19</sup> Thus, the addition of the Sheridan replacement to the HFM program does not constitute a fundamental shift in Army thinking.

#### CONTEMPORARY CHANGES AND THE QUESTION OF HEAVY VS. LIGHT

The years of economic mismanagement and the Soviets'

insatiable military appetite fed by a national paranoia, have finally brought about the ultimate crisis for communism predicted by Kennan. At the same time, however, concerns for regional conflict are increasing, such as the Persian Gulf. To a large degree, these conflicts have always been present, but have been overshadowed by the Soviet problem which consumed our attention and resources. The violence of such conflicts would now be exacerbated by the omnipresence of large, modern armies in the third world.

Given this diminishing Soviet threat with the concurrent proliferation of modern, armored forces throughout the emerging multipolar world, the question is whether the present force structure with its dependence on heavy armor is suitable for the military missions of the future? Will the reduced size of the Army itself demand a change in the force structure? Should the present modernization effort be revamped? This paper argues that the answers to these questions are:

- (1) No, heavy forces are not suitable for future missions;
- (2) Yes, the smaller force will have to be more versatile, with all components capable of handling the spectrum of contingency requirements and not dedicated to a specific mission;
- (3) Yes, the present modernization program must address the need for a light armored force with firepower and protection equivalent to traditional heavy forces.

The remainder of this paper will present the arguments supporting these answers. The next chapter will review the rationale for the "Situations" and the ensuing military "Corollaries" presented in the Introduction.

#### ENDNOTES



1. John Spanier, "American Foreign Policy since World War II," Congressional Quarterly, 1988, 11th ed., p. 33.

2. Ibid., p. 35.

3. There is some issue whether the originators of the containment strategy ever intended it to be applied globally. See, e.g., Spanier, p. 42.

4. It is arguable whether in fact the limited U.S. nuclear arsenal deterred the Soviets from further European aggression. See Spanier, pp. 37-40.

5. The assumption of containment was a premeditated Soviet attack and hence presumably fully mobilized, and not spontaneous as in response to a crisis.

6. "Survivability" means the ability not to be seen; if seen, the ability not to get hit; and if hit, the ability not to be killed.

7. E.g., spoiling or diversionary action, rear guard, etc.

8. Soviet interest in the region extends back to World War II, during which American supplies were funneled through Iran to the Soviet Union.

9. Based on 500 C-141 equivalent sorties at the nominal USAF planning factor of 25 tons per sortie (approximately 50% maximum capacity on the average loading).

10. Peter F. Herrly, "Middleweight Forces and the Army's Deployability Dilemma," Parameters, Vol. 19, No. 3, September 1989, p. 51.

11. Ibid., p. 49.

12. David Segal, "Army Light Infantry Divisions: Are They Fit to Fight?," Armed Forces Journal International, October 1988, p. 88.

13. Jane's, Armour and Artillery 1986-87, 7th Ed., pp. 116, 122, 435, 442, 514, 531, 533, 535.

14. Stanley Spaulding, et al., Performance Analysis for the Armored Family of Vehicles, Vol. 1., TACOM Contractor Report No. 13349, 18 April 1988, p.12.

15. An excellent example of support for a weapon is an autoloader in a tank. As the size of the round increases both in volume and weight, an autoloader is necessary to maintain rate of fire.

16. The combat mobility vehicle or CMV is for obstacle breaching, not obstacle making, as is the common usage of the traditional engineering vehicle.

17. Caleb Baker, "New Heavy Force Plan to Call for Light Tanks," Defense News, 19 February 1990, p. 1.

18. Weight must be less than twenty tons for C-130 transportability. See Jane's, All the World's Aircraft 1988-89, 20th ed., p. 417.

19. For example, the "Just Cause" operation into Panama in December, 1989.

### CHAPTER III

#### SITUATIONS AND COROLLARIES

Eternal peace lasts only until the next war.

-Russian Proverb

This chapter will expand upon the four fundamental situations and three corresponding military corollaries presented in the Introduction. These result from the nature of the global political picture and the military threats to U.S. interests which are emerging as a consequence of the radical devolution of the Soviet empire.

#### SITUATIONS

First Situation: U.S. forces will be at home.

What a beautiful fix we are in now: Peace has been declared.

-Napoleon I: After the Treaty of Amiens,  
27 March 1802

The first situation the U.S. will be confronted with in the new order is that its forces will be stationed at home. Principle U.S. forces stationed outside the U.S. are in Europe (326,400), Korea (43,200), Japan (50,500), Philippines (17,300) and Panama (10,700).<sup>1</sup> The European forces will be reduced by the Conventional Forces in Europe (CFE) treaty,<sup>2</sup> by a European sense against foreign intrusion (no matter how well intended or useful in the past) and by growing U.S. fiscal constraints. Forces in Korea will be reduced largely by the U.S. fiscal constraints and the growing recognition that South Korea has sufficient capability to hold off North Korea, at least until help arrives. Propositioning of some heavy equipment will allow a rapid return of a combat ready U.S. force to Korea, to be supplemented further by sealift. Token U.S. forces in Europe,

Korea, and Japan will act as "tripwires," to warn potential aggressors that the U.S. will respond to hostilities. In the case of Europe, U.S. forces may also perform additional roles as peacekeepers or policemen<sup>3</sup>. In Europe, the luxury of prepositioning supplies and equipment will be severely curtailed by the CFE accord.<sup>4</sup>

Second Situation: The threats demand contingency operations.

When ye encounter the unbelievers, strike off their heads, until ye have made a great slaughter among them. Verily, if God pleased, He could take vengeance upon them without your assistance, but He commandeth you to fight his battles.

-The Koran XLVII

While the threat of Soviet aggression in Europe and Southwest Asia has largely evaporated, a review of actual warfare throughout the world today provides the U.S. ample concern for involvement in some conflict to protect its political and economic interests. The Middle East and North Africa continue to be a tinderbox in the midst of four major U.S. interests: Israel, oil, state terrorism, and freedom of seas (Suez, Persian Gulf). Ethnic, tribal and religious hatreds, revanchist and imperialist land claims, theocratic and autocratic governments, mentally unstable tyrants, and abysmal standards of living combine to make the region of continuing concern. Granted, the U.S. commitment to the use of military power in support of some of its interests is uncertain. On one hand, it has already proven a willingness to commit naval power (Persian Gulf tanker patrol) and short term special operations on the ground (Tehran hostage rescue attempt). However, direct defense of oil fields or of Israel, for instance, has never been demonstrated.

Civil war, aggression, and weak economies in Southeast Asia continue unabated. However, given its experience in Vietnam, the

U.S. would not likely become involved again in a sustained conflict in that region. The tensions between North and South Korea continue to seesaw. The truce has held for thirty-seven years, but the eventual change in leadership in N. Korea may create a new instability. The Indo-Pakistani confrontation remains a potential war, greatly affecting U.S. interests on both sides of the conflict.

While the U.S. has interests in both Africa (south of the Sahara)<sup>5</sup> and South America, recent history seems to indicate that the U.S. would not become militarily involved. In contrast, the U.S. remains committed to its hegemony in Central America and the Caribbean, as evidenced by military actions in the 1980s.

The conclusion is that there is a variety of possible military actions in which the U.S. might consider becoming involved. All of these scenarios are contingency situations, involving potential, not certain, situations. This is in contrast to Europe, wherein the Soviet threat was understood to be real and imminent, and thus required U.S. involvement for deterrence. These scenarios are speculative: We don't know when, where, or if we might become involved. But if we do, then by the first corollary, time will be of the essence. This is the essential quality of contingency operations.

Third Situation: Opponents may be large and heavily armed.

In our day wars are not won by mere enthusiasm, but by technological superiority.

-V. I. Lenin, Speech, 1918

The proliferation of modern arms to the Third World<sup>6,7</sup> over the past twenty years has been a double-edged sword for the superpowers who have promoted those sales and transfers to further their political or economic aims. Today, those forces have fostered indigenous arms industries<sup>8</sup> that further feed the

fire. Furthermore, the superpowers have lost control of the armament dole as other developed countries have entered the foreign arms sales industry as a way to further their own economic interests.<sup>9</sup> The third world weapons are not simply tanks, artillery, and fighter aircraft, although these are threats enough. They now include missiles and chemical weapons.<sup>10</sup> The table below summarizes some of the major armies (not necessarily adversaries) who are capable of serious resistance to an American expeditionary force.

The observation here is that among these countries are several who are or may be hostile to the U.S. and who possess large, modern armies. Clearly, the U.S. possesses overwhelming combat power in all of these categories of hardware. The problem argued here is its armored forces, with their appropriate firepower and protection, cannot, in general, be brought to bear rapidly. However, the light forces which have been designed and built to be rapidly deployable for contingencies would have great difficulty against these armies. The U.S. must improve the strategic mobility of its armored forces if it ever expects to be capable of opposing forces such as these indicated in this table. This strategic mobility can, in principle, be improved either by massive air and fast sealift capability or by changing the force and its equipment to be more mobile with the lift available and yet be lethal and survivable to fight armies as capable as those above.

Fourth Situation: Economic concerns will outweigh military concerns in the U.S.

When the army marches abroad, the treasury will be emptied at home.

-Li Ch'uan c. 905

The American public is now keenly aware of the seemingly

TABLE<sup>11</sup>

A SAMPLING OF MAJOR THIRD WORLD ARMIES COMPARED WITH  
U.S. AND CERTAIN EUROPEAN POWERS

COUNTRY	MEN (x1000)	TANKS	ARTY*	APC/ IFV**	FIGHTER AIRCRAFT	HELOS
Brazil#	311	630 (LT)	590+	950	50	135
China#	2300	c.8000	18,300+	2800+	C.4500	400
Cuba	145	1100	UNK	650	172	68
Egypt	320	2425	1560	3700	442	173
Ethiopia	313	750	700+	870	138	39
India#	1100	3150	4120	1100+	790	420
Iran (approx)	305	500	800	600	85	410
Iraq# (approx)	955	5500	3700	8100	323	160
Israel#	104	3800	1360+10,780		540	238
Libya#	55	1980	1720	1550	285	29
N. Korea	930	3200	7200	1800	550	115
Pakistan#	480	1750	510+	800	421	122
S. Korea	575	1600	4100+	1810	320	400
Syria	300	4050	2400+	4300	459	245
Vietnam	1100	1600	UNK	1620	382	30
U.S.#	961	16,700	6850	31,780	4700	8940
U.K.#	155	1290	550	3640	650	310
FRG	341	5000	5770	1270	700	740
U.S.S.R#	1613	53,630	30,500	60,590	4600	4500

NOTE: "MEN" includes Army and Marines or Naval Infantry in all cases.

\*Artillery, cannon and rockets, excluding mortars and ballistic missiles

\*\*Armored Personnel Carriers and Infantry Fighting Vehicles

# Chemical and/or nuclear power (Actual or probable)

incurable federal deficit, the escalating trade imbalance, the declining industrial productivity, and the soaring need for public investment to overhaul the domestic infrastructure. Consequently, it sees the retreat of the Soviet Union as an opportunity to redirect U.S. priorities towards alleviating festering domestic problems. The actions of Congress, hot in the pursuit of the alleged "peace dividend," typify this attitude. In the long run, this may truly have a greater bearing on our national security and well-being than a continued drive for military dominance. National issues such as the federal deficit, trade imbalance, education, drugs, civil infrastructure, the environment, etc, all impact the national well-being and security in a larger sense.<sup>12</sup> The American public understands that a good economy is required to support a good military. Whether or not this reorientation toward the economic imperative is correct, the trend is real and likely to persist for a considerable time. Only the resurrection of a new military threat, perceived by the American public to have import greater than that of the economic concerns, will restore military spending to its former glory.

#### COROLLARIES

A "corollary" is something which naturally follows and which requires little or no additional proof. These corollaries follow quite directly from the Situations presented in this paper. Nonetheless, there are a few points that warrant expansion. The three corollaries are, to repeat:

- U.S. forces will have to move fast and go anywhere,
- They will be smaller and budget-constrained,
- They must have firepower, mobility, and survivability.

The first corollary follows from the notion that the troops will be at home and that U.S. interests will remain worldwide in scope. The first question in this matter is how fast is fast enough when attempting to move the troops in a contingency. That



cannot easily be answered in advance, but the nature of a contingency includes elements of surprise and emergency. The principal concern in a contingency is the threat of a fait accompli by the opponent if one is tardy in responding. This would be particularly damaging if the integrity of some major oil fields were at stake or if the collapse of a friendly government before our arrival would make later entry more difficult. Also, the U.S. may wish to execute a coup de main and in so doing terminate the conflict rapidly while minimizing losses for both sides. Finally, a sufficiently rapid arrival may permit the opportunity to defuse a crisis before warfare begins. A tripwire, light force may do this, but a larger, heavier force is probably more effective.

The second question in this matter is how much would the U.S. have to move in this fast manner? This relates to the combat capability of the expeditionary force and is also part of the consideration of the third corollary. The problem is that the more that must be deployed to the theater, the longer it will take. Whereas in one contingency, the movement of a single heavy division in 30 days may be sufficient, in another contingency, four heavy divisions in 30 days may be required, with the first one in place in a week. Whereas the first case permits using the existing fast sealift capability of the eight Fast Logistics Ships (TAKR<sup>13</sup>), the second case exceeds the U.S. capacity in both air and sealift.

The second corollary, that U.S. forces will be smaller and budget-constrained, is obvious as Congress and the Army negotiate new force levels. A recent Army plan would cut strength to 580,000 by 1997.<sup>14</sup> Barring a return of the cold war, this number will continue to drop further to the turn of the century. The final, stabilized number will hinge on the answers to three questions. First, how small an Army is possible for the U.S. to retain its "superpower" status? Second, how large an Army do we need to reasonably meet genuine contingencies and commitments?

Third, how large an Army can we afford without sacrificing higher economic goals (in an increasingly economically-oriented world)? The answers to these questions are beyond the scope of the topic here, but for purposes of argument, this paper postulates an active component army of 500,000 men and 10 active divisions. This active component becomes even more important in this future as the necessity for rapid response precludes utilization of reserve combat forces in the critical initial weeks. The reserves, nonetheless, constitute a valid core of reinforcements and are especially useful in the European role wherein the warning time of a Soviet attack is now quite large<sup>15</sup> and such troops can be mobilized, prepared, and deployed.<sup>16</sup>

The second aspect of this corollary is the fiscal constraints over and above the direct impact on the size of the force. The cost of ownership of a force is strongly dependent upon the type of force it is. Not only does a heavy armored force have a much higher initial procurement cost than a light force, but its sustainment and training costs are also greater. Heavy equipment simply uses more fuel, breaks down more frequently and costs more to maintain.

The last corollary demands firepower, mobility, and survivability for the force. This requirement stems from the potential array of armies against which the U.S. might have to fight. Firepower is a product of the types of weapons fielded and the size of the force brought to the field. The size of the force is not the issue here. That is determined by the military commanders involved and impacts the thesis of this paper through the first corollary, namely that a larger force takes longer to deploy. Rather, this corollary addresses the equipment necessary to confront one's opponents. Firepower means having sufficiently powerful weapons to defeat the survivability features of the opposing weapons. On the opposite side of the coin, survivability of one's own forces means the capability to withstand the opposing weapons. Against projectiles and

explosives, this traditionally means armor. Lastly, mobility for the force on the battlefield (not in deployment) means having sufficient vehicles to move one's forces rapidly.

Conventionally then, firepower, mobility, and survivability combine to create the armored or mechanized infantry division consisting of self-propelled artillery and air defense pieces, heavy tanks, armored personnel carriers and infantry fighting vehicles, armored engineering and resupply vehicles, and a host of trucks and trailers to move all the rest of the equipment and supplies. This is exactly the heavy force which is well suited to confront conventional armies similarly equipped. But as pointed out previously, it does not deploy rapidly and is very expensive to own and operate.

The next chapter analyses the problem from the point of view of strategy. Strategy introduces the idea of "concepts" or "ways" to link resources with objectives to arrive at a viable solution.<sup>17</sup> As various concepts are analysed, these corollaries again become the discriminating factors that cull the unworkable from the workable.

#### ENDNOTES

1. Brassey's, The Military Balance 1989-1990, pp. 32-191.
2. David E. Shaver, "On Disarmament: The Role of Conventional Arms Control in National Security Strategy," Strategic Studies Institute, U.S. Army War College, p. 89.
3. Theresa Hitchens, "NATO Leaders Reconsider Use of Multinational Forces," Defense News, 12 February 1990, p. 9.
4. Shaver, pp. 89.

5. General Accounting Office, South Africa, Summary Report on Trade, Lending, Investment, and Strategic Minerals, 1988, p. 40.
6. Molly Moore, "GAO Says Low-Intensity Threat Unmet," Washington Post, 16 March 1990, p. A10.
7. "Organization of the Soviet Armed Forces," Air Force, March 1990, p. 68.
8. Caryle Murphy, "Iraqi Leader Presses Drive For Regional Dominance," Washington Post, 23 March 1990, p. A16.
9. Giovanni de Briganti, "French Aerospace Industry Had a Record Year in 1989," Defense News, 5 March 1990, p. 6.
10. Association of the United States Army, Landpower: The Decisive Element, Rev. November 1984, pp. 49-57.
11. Brassey's, pp. 33-191.
12. Hodding Carter III, "U.S. Could Well Snatch Defeat From the Jaws of Victory," The Wall Street Journal, 29 March 1990, p. A13.
13. Navy League of the United States, The Almanac of Seapower 1990, p. 188.
14. Patrick E. Tyler, "Army Plans Major Cut In Troops," Washington Post, 15 April 1990, p. A1.
15. Patrick E. Tyler, "Nunn Calls Defense Plan Flawed," Washington Post, 15 December 1989, p. A1.
16. A larger warning time may certainly offer the U.S.

relief in terms of deployment time, permitting, in the European scenario, at least, the luxury of cheaper sealift at the outset instead of the much more expensive airlift. However, warning time is meaningless unless acted upon politically. The greatest hazard, therefore, is that the requisite mobilization of the National Guard and the Reserves would be delayed by domestic political considerations until the bulk of the warning time had been consumed.

17. Arthur F. Lykke, Jr., "Towards an Understanding of Military Strategy," in Military Strategy: Theory and Application, ed. by Arthur F. Lykke, Jr., p. 3.

## CHAPTER IV

### A QUESTION OF COHERENT STRATEGY

The theory of war and strategy is the core of all things.

-Mao Tse-tung: Problems of War and Strategy, 1954

The problem of defining a new and germane force structure is now examined from the perspective of strategy. Strategy, to be complete, must contain three elements: objectives, concepts, and resources.<sup>1</sup> Not only must a strategy have these elements, but they must be balanced or the strategy will not stand, much as the three legs of stool must all be of equal length. It is a given that resources are declining dramatically<sup>2</sup> in response to the reduced Soviet threat. A balanced strategy thus demands that the other two legs must be adjusted consistently with the resources. The two shall be examined individually.

#### OBJECTIVES

If our aim is low, while that of our enemy is high, we are bound to get the worst of it.

-Clausewitz: On War, 1832

The declining resources are a Congressional result of the perception of a reduced threat of Soviet attack in Europe. This can be translated immediately into the elimination of the military objectives of massive forward deployment and reinforcement of ten divisions in ten days. These objectives form the core of the mission for deterrence and, if necessary, warfighting capability against a massive Soviet attack. However, as the threat of actual premeditated Soviet assault on Western Europe has receded, other concerns have arisen. First, the changes in Europe have been truly revolutionary and not evolutionary. This has created, for the interim at least, a concern about instability.<sup>3</sup> In turn, this has led to a new objective of having a political and military security blanket to

moderate any tendencies for intemperate moves by new governments. The possibilities for such actions become evident when one considers the variety of historic ethnic animosities in the region plus the emerging revanchist claims emanating from the fluid borders of Europe throughout this century.<sup>4</sup>

The second concern is the desire of the U.S. to continue its participation and influence in shaping West European events. There are different ways for the U.S. to do this. Although the principal instruments would be diplomacy and economics, there is a perception by some that for the U.S. to continue its role in Europe, a physical presence is advantageous. One obvious approach to presence, but not necessarily the best, is to continue a military presence at a level sufficient to be visible. This constitutes a second new objective: Justify U.S. continuation in European affairs through its (military) presence there.

The third concern is that of the Soviet Union itself. As Paul Warnke, former director of the Arms Control and Disarmament Agency, recently said, "The Soviet Union may become a better neighbor, but it will still be a very big neighbor."<sup>5</sup> The Soviet Union itself is subject to instabilities, civil war, and, less likely to be sure, the return of a conservative anti-West government as a solution to its internal problems. In fact, such a government may find its public more satisfied with the restoration of social and economic order. Further, to restore a sense of national unity, this government may opt for the identification of an outside "villain." Thus, the third objective is not really new, but instead a diminished version of the original objective vis-a-vis the Soviet Union; simply put, the U.S. must remind the Soviet Union that it is still in West Europe and will defend it, if necessary.

Outside of Europe, there have also been changes to the threat. There are three locales wherein the U.S. has either

trained or used ground forces in the past or purports it might use force under certain conditions: Korea, Central America, and the Middle East and North Africa. The North Korean threat remains unabated. However, in the light of the growing capability of the South Korean military, the necessity for extensive involvement of U.S. ground forces is unlikely even if North Korea should attack.<sup>6</sup> Thus, the general objective, to defend South Korea is unchanged, but the concept for its defense needs to be readdressed. In particular, a forward deployment of ground forces is no longer necessary and the U.S. commitment should, instead, be limited to combat aviation and general logistical support.

Despite the recent democratic victory in Nicaragua, Central America still festers with small insurgencies. In addition, drugs, illegal immigration and economic instability threaten the democratization process in many Latin American countries and, in turn, threaten the U.S. However, these problems are not easily translatable to the coherent use of the military element of power except on the level of extremely low intensity conflict or in a contingency such as Panama and Grenada.

The biggest change is in the Middle East. The faltering of the Soviets' empire-building by military force creates a big decrement in the threat from Syria, Libya, and the Soviet Union itself in the Persian Gulf area. The U.S. has always had an objective to keep the Soviet Union out of the oil fields and away from the coast of the Indian Ocean. That objective has been overcome by events: The Soviet threat to the Gulf is not and can not be credible regardless of what might occur internally in the the Soviet Union. The Soviet Army's performance in Afghanistan is sufficient proof that they cannot succeed in a quest for the Gulf which would involve fighting against much of the Islamic world, including probably many of their own people in the southern republics.



The only other U.S. land objective in the Gulf area would be the preservation of the oil fields. While the Soviets were earlier perceived as the principal threat to the fields, Iran and Iraq are now seen as powers most likely to threaten. Possessing both oil and ocean access,<sup>7</sup> they have different motivations for disrupting the oil business from those of the Soviets. Iran, in particular, before the truce, sought to disrupt oil shipments out of the Gulf as a way to exert pressure on the Arab supporters of Iraq and thence on Iraq itself. Iranian ethnic hostility towards the Arab oil producers further encouraged their attacks on the oil flow. Iraqi interest in obstruction of the oil is more speculative, but would be clearly related to its hegemonic ambitions over its fellow Arabs.<sup>8</sup> Thus, a U.S. military objective is postulated calling for the defense of the oil fields against a regional threat. This objective would support U.S. allies in Europe and Japan and promote the general economic good of the West. Whether the interim loss of the oil would be worth the costs of war is not addressed here. What is important is that although such a scenario has a low probability, it is plausible.

In conclusion, therefore, the emerging world order has led to a change in military objectives. While the historically principal objective in Europe, the containment of the Soviet Union, has been downgraded, numerous other objectives there and elsewhere have arisen or been upgraded. This new suite of objectives must then link to the resources available through appropriate concepts. That is to say, concepts must be found that will permit the support of these new objectives with the resources expected. If this cannot be done, then not all of these objectives can be realistically retained as policy.

#### CONCEPTS

It is war that shapes peace, and armament that shapes war.

-J. F. C. Fuller: Armaments and History, 1945

To successfully address these objectives, the U.S. would need a force that simultaneously satisfies all three of the Corollaries of Chapter III. That is, the force must be a versatile, mobile, and survivable force, capable of fighting across the spectrum of conflict against opponents of varying capability. In particular, it must be lethal against armor and survivable against heavy weapons fire. Rapid deployability for a quick, timely arrival is a necessary feature of those same forces which must be capable of fighting the heavy opponent. The size of the force ideally would depend upon the number of conflicts expected at any one time, the fraction of the force usable in (i.e., appropriate to) a given conflict, and upon the size and capability of the opposition. However, the resource constraints predicated herein have already led to the assumption of a politically acceptable force of 500,000 people in ten divisions. Finally, that same resource constraint strongly dictates a force inexpensive to operate as well as to buy initially.

The interest here is in the structure of that force. Three arrangements are offered, but two are rejected based upon the arguments of the previous chapters. First, one may have the conventional heavy/light mixed force, scaled down in size from the one the U.S. presently has. This is unacceptable because the heavy fraction cannot be moved sufficiently fast to most of the theaters in sufficient amount to matter, given the air and sealift capabilities now and projected. The light force is more readily deployable, but cannot successfully fight many of the opponents because of lethality, mobility, and survivability deficiencies. A change in the ratio of heavy to light makes no improvement to the situation. A larger light force, no matter how large (within the ten division limit) and rapidly deployable, cannot overwhelm large armored forces and American casualties would be enormous. A larger heavy force is, of course, still unworkable as earlier analysed because (1) it cannot address contingencies demanding rapid deployment, (2) it is unsuitable in

certain kinds of conflict and in some terrain, (3) it is not large enough (up to the ten division limit, or less actually, allowing for some SOF structure) to preposition in all the potential trouble spots of the globe even if basing rights were somehow attained, and (4) the cost of the force would probably be unacceptable even within the assigned manpower ceiling.

A second option is to procure a massive sea- and airlift capability to move the necessary forces of the existing structure with the speed demanded by contingencies. As an example, consider a worst case situation that requires the deployment of two heavy divisions<sup>9</sup> to a theater 10,000 miles distant in thirty days. The existing fast sealift fleet (8 TAKRs<sup>10</sup>) can deliver and offload one division to the debarcation port in 24-25 days, if the division is at the ports of embarkation within the four days it would take for the ships to arrive at the ports. The division is not yet at the front so further time is required to deploy forward either by road or by rail, and at a comparable speed to the ships. Rail, if available, requires additional time for loading. A second division could be delivered in another 40 days, clearly too late for the requirement, but sufficient probably for later reinforcements.

The existing airlift allocation could move the remaining division in 73<sup>11</sup> days which is again inadequate. Like the sealift, this is not "direct delivery" to the proximity of the front. The existing airlift fleet, especially the C-5s required to haul the tanks (one at a time), have lengthy runway requirements which limit their debarcation points to major military or commercial airfields. Thus, further deployment by road or rail is also required here.<sup>12</sup> Also, a sizeable fighting force would not be on the ground for 35 or so days which may or may not be acceptably fast in a crisis. Additional lift could, for instance, be purchased by an additional 8 TAKRs so that the two divisions could be moved by sea inside the 30 days. However, no force at all would be in the theater for the first 25

days, a possibly worse situation than that offered by the airlift. Furthermore, the distance from the port to the front has not yet been addressed. If the airlift allocation were expanded to include half of the projected 180 aircraft C-17 fleet<sup>13</sup>, then that same second division could be airlifted in 47 days. While still falling short of the requirement, considerable progress has been made. A significant fighting fraction would be on the ground in 20-25 and the C-17 portion can be "direct delivered" to the proximity of the front, thus saving possibly several more days transit time overland.

The problem is that the entire airlift allocation to the region cannot be devoted exclusively to the deployment of one division. An Army Corps, including headquarters, combat support, and combat service support assets, must be deployed also. Much of this would be sealifted, of course, but if troops are already in the theater and fighting, some elements of the Corps must arrive with them. This is one of the main differences between the true contingency with no prelocated assets and Europe, wherein the Corps structure is fully implanted in the theater and additional divisions are simply reinforcements.

The Air Force has further deployment requirements of its own for support of both its transports and its fighters. Thus the shortfall in air and sealift assets is considerably understated in this example. The recent Panamanian action provides certain insights. As a contingency operation, the Panama incursion offered a uniquely advantageous situation. Most of the required equipment and supplies (including most of the armor that was used) were prepositioned in the Canal Zone; over half of the force was already on the ground (Canal Zone) practicing their missions under the guise of training; The air lines of communication from the U.S. were very short by comparison to the Middle Eastern or Asian requirements; and the Panamanian Defense Force numbered only 4,400 with no armor, heavy artillery or surface-to-air missiles. Even so, the airlift of

less than one light division within 24 hours required the use of 124 of the 357 aircraft in the U.S. heavy military transport fleet, excluding tankers (i.e., the C-5s and C-141s).

While this second option (to procure massive air and sealift capability) may be technically and even economically feasible, it is certainly not advantageous. The retention of the heavy/light mix concept, even with the augmented lift, retains two major shortfalls. First of all, as discussed already, the two types of forces are uniquely suited for certain roles, in certain terrains, against certain opponents, and are not necessarily suitable as reinforcements for one another. They complement, but do not necessarily supplement, each other. This may become critical as the size of the force shrinks with fewer division to go around for reinforcement. The second drawback is that the heavy fraction is still a very costly force which may quickly turn into a serious financial liability as resources continue to decline. Together, these two objections render this option inferior to the last option.

The last concept option is to introduce new technology to close the gap between weight and survivability. This would allow an approximately uniform structure (with the exception of the SOF element) wherein most of the force would consist of physically light, but armored divisions, with the firepower of the conventional heavy division.<sup>14</sup> The force would be universally deployable, yet lethal and survivable against the worst case. Such divisions and the Corps slices would not be as light as the current light divisions, but they can be vastly more powerful and better protected. If the weight can be brought down to 50,000 tons or less and the heaviest vehicles to no more than 35 tons (therefore, transportable for 2500 nautical miles per leg by C-141, C-17, or C-5 with one, two, or three vehicles, respectively<sup>15</sup>), a mix of airlift and fast sealift may allow sufficiently rapid response for most or all of the probable contingencies. For instance, the previous example of moving two

divisions 10,000 miles in 30 days, can almost be done with the 50,000 ton division, using existing lift (25 days by sea, plus 36 days by air). Again, however, this ignores the additional lift needs of the Corps and the Air Force and hence is still optimistic. Nonetheless, the fact remains that cutting the division weight in half also cuts the air deployment time in half with no additional lift purchase or allocation. An allocation of 35 C-17s to the above problem would allow the deployment of the 50,000 ton division in the required 30 days.

Moreover, the introduction of the C-17 into the MAC fleet not only further improves deployment time because of the additional capacity, but it also permits delivery of the division to the immediate proximity of the war, a time-saving feature not necessarily possible with the existing equipment which is limited by the distance from the coastline port or from the major airfields suitable for the C-5 and C-141. Such major facilities as those are also prime targets for enemy attack. The C-17, on the other hand, has tremendous short field capability that permits it to land and disembark its load at the far more numerous smaller and unprepared airfields found in most locations.

#### THE BALANCED STRATEGY

Our object ought to be to have a good army rather than a large one.

-George Washington: To the President of Congress,  
15 September 1780

A balanced strategy requires appropriate tuning of the three legs of strategy, the resources, objectives and concepts. The U.S Army is confronted today with a future of limited resources, yet a plethora of diverse objectives. There seems to be only one satisfactory alternative among the concepts which might bridge the gap between resources and objectives. Whether

such an approach is viable depends on the extent to which technology can lighten the load while retaining the combat qualities of firepower and survivability. Appendix I addresses in more detail the possible structure of that division and the technologies which might be employed for its success.

#### ENDNOTES

1. Arthur F. Lykke, Jr., "Towards an Understanding of Military Strategy," in Military Strategy: Theory and Application, ed. by Arthur F. Lykke, Jr., p. 3.

2. Patrick E. Tyler, "Study Suggests Halving Defense Budget in 10 Years," Washington Post, 21 November 1989, p. D1.

3. Georgie Anne Geyer, "Peace, But Not Quiet," Patriot (Carlisle, Pennsylvania), 23 March 1990, p. A9.

4. For example, see Blaine Harden, "Romanian Clashes Affect Hungarian Election," Washington Post, 23 March 1990, p. A16.

5. Paul C. Warnke, "Arms Control in a New Age," Arms Control Today, December 1989, p. 3.

6. "Talking Troops and Dollars in Korea," New York Times, 24 February 1990, p. 24.

7. According to the Central Intelligence Agency's World Factbook 1989, pp. 141, 142, and 261, Iran's and Iraq's oil export combined nearly equal that of Saudi Arabia, with Iraq the larger of the two.

8. Caryle Murphy, "Iraqi Leader Presses Drive For Regional Dominance," Washington Post, 23 March 1990, p. A16.

9. Today's force structure has ten heavy divisions of eighteen total in the active component, so presumably if the active force were reduced to ten division, roughly five or six would be heavy. Thus, this scenario calls for the deployment of up to 40% of that heavy force.

10. Navy League of the United States, The Almanac of Seapower 1990, p. 188.

11. Assuming an allocation of 50 C-5s and 100 C-141s, operating ten hours per day, with average ("Block") speeds of 422 and 409 knots respectively, and at 50% load factors (remembering that much of the cargo fills the plane before it weight limit is reached, e.g., helicopter airframes are bulky, but light), a hauling capacity of 1366 short tons per day is achieved. At 100,000 tons for the division, 73 days, more or less, is required. Movement of the troops is presumed to be by commercial aircraft (Either charter or commercial reserve fleet), and is therefore not included in this analysis.

12. The C-17, by virtue of its short field performance, can "direct deliver" to the proximity of the front, thus saving additional transportation time.

13. The full procurement plan for the C-17 calls for 210 aircraft of which 30 are for training and replacement, leaving therefore 180 in actual use.

14. Principally here, we are talking about 348 tank main guns, 72 155mm howitzers, 9 MLRS launchers (each capable of simultaneous firing of 12 missiles), 240 25mm chain guns, 24 107mm mortars, 30-odd attack helicopters, and a large number of TOW missiles mounted somewhat safely on armor.



## APPENDIX I

### THE NEW TECHNOLOGY PARADIGM

...a pretty mechanical toy...

-Lord Kitchener, 1915

The following paragraphs will present some ideas on ways to achieve the goal of a 50,000 ton "light armored division" having essentially the principal attributes of a conventional heavy armored division, namely mobility, firepower, and survivability, but in half the weight. As the title suggests, the main focus is on the employment of technological solutions. However, such an exclusive approach may strain the limits of the purported technology capabilities (and therefore the cost), and so other non-technical concepts are also offered to supplement the weight savings goal. These ideas are not necessarily the only, or even the best, approaches to the problem. A proper study would have to address in detail any functional or operational changes to the division in addition to the viability and cost of the technology. Obviously, the point can be reached at which the cost or the loss of operational capability per ton saved is excessive. At that point, further weight reduction should be replaced by increasing the airlift capacity or acceptance of a longer deployment time. Such a review is beyond the scope of this appendix.

The suggestions presented herein will be criticized for being detrimental to one or more of the warfighting capabilities required of the existing heavy armored division even in a Third World conflict. Rapid deployment is nice, say the critics, but delivering convincing force is mandatory.<sup>1</sup> It will be claimed, with some justification, that weight simply cannot be removed from a division, despite technology or doctrinal changes, without adversely impacted survivability (less armor), firepower (fewer or lighter weapons), or mobility (e.g., wheels vs. track).

Thus, it will be alleged, that such changes are either self-defeating or unamerican (i.e., putting american troops at an unnecessary risk).<sup>2</sup> There are two responses to this claim. First, the actual impact of technological and structural changes must be evaluated quantitatively and done so against the plausible Third World threats. The Congress and the public simply will not accept a budget justification built exclusively around the unlikely worst case "Future Soviet Tank (FST) 3," which as yet does not exist and whose capabilities are speculative. Second, direct Presidential guidance instructs the military to compromise its weaponry for Third World as well as European use.<sup>3</sup> Such a compromise, if done judiciously, may well provide the Army with a more flexible and creditable force overall, given the inevitable budget constraints forthcoming.

To begin with, it is necessary to see the problem. The weight of the heavy armored division is allocated as follows:<sup>4</sup>

Tracked vehicles:	48,871 tons
Trucks:	23,913 tons
Trailers:	4,206 tons
Aircraft:	249 tons
Equipment:	13,793 tons
Expendibles <sup>5</sup> :	variable

TOTAL	91,032 tons
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It is reasonable to allocate weight savings as follows:

Tracked vehicles:	-23,000 tons
Trucks:	-14,000 tons
Trailers:	-1,000 tons
Aircraft:	0
Equipment:	-3,000 tons

TOTAL	-41,000 tons
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This weight reduction would then achieve the goal of a 50,000 ton division, at least within the quantifiable weights provided. Efforts to reduce weight will be directed at only the vehicles and the trailers. The weight savings in the equipment category is postulated as a second order effect resulting from the vehicular weight savings or changes in vehicle numbers reflecting directly into such equipment items as maintenance hardware (e.g., cranes, etc.) that are dependent upon the number of vehicles and their weight. Weight savings in fuel usage (a portion of the "expendibles" category) will also accrue as a direct result of the lightening of these vehicles.

Consider first the tracked vehicles. The 348 tanks (M1) alone account for 22,000 tons and are the principal weapon of the division (the raison d'etre). The remaining 26,000 tons of tracked vehicles are accounted for by 1467 other vehicles distributed among 18 types. The next largest contributors are a near tie between the M2 infantry fighting vehicle (216 for 4500 tons) and the M88 armored recovery vehicle (86 for 4700 tons). The division artillery's various weapons and tracked weapon support vehicles collectively account for another 6800 tons in 459 vehicles.

Replacement of the M1 with a 30 ton tank will save 11,400 tons. This can be achieved at no practical loss in present survivability by introducing composite and other innovative armors, a turretless gun, and a three man crew. Any alleged reduction in armor protection will be offset by, first, the smaller tank being harder to hit, and second, the smaller tank permitting the allocated armor weight to be applied more thickly over the smaller surface area. At some degradation in off-road mobility, a wheeled powertrain should be considered.

The remaining weight savings will be harder to achieve. With the lighter tank, the M88 can be replaced with a slightly

upweighted M578-type recovery vehicle, saving a net 2200 tons. The M3 is for reconnaissance and not intended for direct confrontation with an armored opponent. That vehicle can be replaced by a smaller, wheeled scout vehicle such as the V150 Scorpion, saving a net 900 tons. The M2 itself has experienced a weight growth problems recently due to additional armor. Conversion to a composite-armored wheeled vehicle can save five tons per vehicle (22%) with a division net savings of 1000 tons. The ubiquitous M113 armored personnel carrier and its cousins, the M577 command post, the M981 fire support vehicle, and the M901 Improved TOW Vehicle, totalling 810 vehicles and 9000 tons, can shed 20% weight with composites and wheels, netting the division another 1800 tons. Replacement of perhaps half the M163 Vulcans and M48 Chapparals with additional stinger-mounted M998 High Mobility Multi-purpose Wheeled Vehicles (HMMWV) and towed Chapparals may suffice in an interim period. In this regard, the discontinuance of the "Defender 2" lightweight air defense system for the HMMWV (twin 25mm guns, plus stinger missiles) was perhaps shortsighted. This would save another 360 tons. Following the same logic, some of the M901 armored TOW vehicles might be replaced by TOW-carrying HMMWVs (M1045), saving up to 250 tons.

Lastly, we might recognize the necessity for trade-offs between arriving on time for the fight and arriving too late, although fully prepared. Winston Churchill once cautioned against spending too much time in the tent buckling on one's armor. If time is of the essence, it might be prudent to delete in the initial deployment one of the three M109 howitzer batteries. This would be 24 M109s plus the associated support vehicles mentioned above. Total weight savings would be 2200 tons. If the firepower were in fact required, towed artillery (M198s) could be employed, although support vehicles (truck ammunition carriers, though) would then be required. The total savings which flow from the above concepts amount to nearly 20,000 tons or over 85% of the goal. Further technical concepts may also help such as new lightweight gun tube technology.

Next to consider is the truck fleet. There is a large stable of trucks designated by number, yet most are distinguished only by superficial differences, such as presence or absence of a winch or crane, armament or cargo carrier, etc. Of the roughly 3000 trucks in the division, over 1300 are 2-1/2 and 5 ton trucks, accounting for more than 13,000 tons or more than half of the total truck fleet weight. Typically, there are between two and two and a half pounds of truck per one pound of payload. This relatively poor ratio has been dictated by economics in both the commercial and the military world. Technology exists for the use of structural composites in lieu of steel and for various lightweight powertrain concepts among which are low heat rejection systems and composites or plastic engines and parts. A goal of one pound of truck per pound of payload is achievable if the Army wishes to pay for it. While probably unaffordable throughout the total Army, selective purchases for rapid deployment forces would reduce the division weight by 7,000 tons just in these two classes of trucks alone.

The heavy haulers (ammunition, fuel, water, etc.) are usually 8x8 vehicles approaching 20 tons each (empty) and account for 6800 tons. Of the 358 vehicles, some 210 support the divisional artillery. If, as earlier proposed, one M109 battery is removed, then about 70 of these 8x8 trucks can also be eliminated, saving 1360 tons. Composite technology on the remaining will save, like the 5 ton trucks, about half the remaining weight or 2700 tons.

The HMMWV is of modern design and being smaller anyway, cannot be expected to realize all the weight savings attributable to the heavier trucks. Yet composite technology in the frame could remove up to 1000 pounds per vehicle (of 5500 pounds), saving the division about 1000 tons. Minor use of plastic and composites in the bodies of the heavier vehicles, the tractors

and the wreckers, where weight does offer some advantages in use, save another 450 tons (10% of weight).

Finally, with the elimination of the heavy tank, most of the 24 Heavy Equipment Transporters (HET) are not needed, saving up to 400 tons. A further possibility to be explored is the substitution of 5 ton trucks for the 2-1/2 ton trucks on a 1-for-2 basis (i.e., same total one-way haul capacity). While this saves little weight, it should improve the division's density so fewer airlift sorties would be needed, which is the ultimate goal. Of course, this may not be practical as the truck total may be dictated by the number of truck missions to be performed, not by the weight to be transported. On the other hand, trucks are not often fully laden, so perhaps some larger ones could be replaced by HMMWVs. However, the overall tactical mobility of the division cannot be lost, so in the end, the division must in toto be able to move itself. As a final note to truck savings, the division's new fuel usage must be reevaluated in the light of the much lower weight. The considerable savings may be translatable into fewer tank trucks and further savings. Totally, therefore, the savings proposed here is just short of 13,000 tons, thus nearly attaining the goal.

Trailers are rather simple devices, but from a structural point of view are essentially truck beds and axles. Thus, any structural technology, such as composites, which would be appropriate to trucks, is also applicable for trailers. However, because trailers do not have powertrains and driver cabs, some of the automotive technology implicit in the truck weight savings, is not applicable. This is also suggested by the fact that the vehicle weight to payload ratio for the trucks (2 to 2-1/2) is actually reversed for the simple trailer (0.4 to 0.5). Thus, as a conservative goal, a flat 25% weight savings from structural composites is projected. This will provide a divisional savings of 1000 tons.

In conclusion, this discussion leads to the result that a massive (on the order of half) weight reduction in a heavy armored division can be achieved with a minimal loss of firepower (as proposed herein). This broad brush sweep of the opportunities cannot substitute for a thorough technical analysis which may alter the conclusion either way, towards greater reductions or less. Alterations in the structure and equipment (deletions or substitutions) must be thoroughly considered for adverse impact on the battlefield in the initial weeks of conflict, before additional equipment can be brought in. In any event, such a division cannot be created overnight. Most of the vehicles in the division are impacted by this proposal and development and procurement of such a suite of new or modified vehicles will take years or decades to complete. Nonetheless, the Army must start now and alter, as necessary, programs like the Armored Systems Modernization program before the next generation of vehicles is cast in iron, quite literally.

#### ENDNOTES

1. James Kitfield, "Rethinking Defense," Government Executive, February 1990, p. 23.

2. Caleb Baker and Neil Munro, "U.S. to Face High-Tech Threat in Low-Intensity Wars," Defense News, 5 February 1990, p. 13.

3. George Bush, National Security Strategy of the United States, March 1990, p. 24.

4. Vehicular and trailer weights computed from vehicular assets tabulated in U.S. Army Field Manual FM 101-10-1/1, Staff Officers' Field Manual: Organizational, Technical, and Logistical Data (Volume I), October 1987, pp. 1-0. [TOE 87000J430] and from weights provided in Jane's, Armour and

Ground Support Equipment, 1987, pp. 525. Non-vehicular equipment weights also obtained from U.S. Army Field Manual FM 101-10-1/1, pp. 2-0.

5. Principally ammunition and fuel in terms of weight, but also food, water, repair parts, replacement items, etc. The requirements will vary considerably, but resupply is a significant lift burden, if by air. For instance, from Volume II of FM 101-10-1, cited above, pp. 2-54 [TOE 87000J430] and p. 2-135, in a high intensity engagement, a division may consume about 1500 tons of ammunition per day and a like weight of fuel. Thus, a thirty day supply at that rate of consumption (unlikely to be sustained, however), doubles the effective weight of the division.



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